

BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Engineering Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Diploma in Computer Engineering Pearson BTEC International Level 3 Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Computer Engineering Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering
Unit number and title	Unit 22: Electronic Printed Circuit Board Design and Manufacture
Learning aim(s)	C: Develop safely a printed circuit board to solve an engineering problem D: Review the development of the printed circuit board and reflect on own performance.
Assignment title	Development of a printed circuit board and reflection on own performance.
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	Your Supervisor is pleased with the progress you have made using the schematic capture and simulation software package. They could now like you to explore some of the software's more complex functions. Your Supervisor has selected a customer product that can be made using a single-sided through-hole PCB and has asked you to use the software package to generate a printed circuit board layout for the product. Your performance on this Task will be the subject of your next review meeting with your Training Manager. To help you prepare for the meeting your Supervisor has suggested that you put together a 'lessons learnt' reflecting on what went well, what could have gone better and what you can take forward to the next stage of your development as a professional engineer.
Task 1	You have been asked to design and manufacture showing refinements, a single-sided printed circuit board from a given circuit schematic design. On completion of the manufacturing and testing, you need to produce a written evaluation that reflects the lessons you have learnt throughout the task. To do this: Your tutor will provide you with a circuit schematic that you



will use to design and make a single-sided PCB. You should then use the software design package to design a single-sided printed circuit board layout for the given circuit schematic. The design should take into account the positioning of components, heat management and fixing points. You will need to:

- Carry out improvements to the design as required.
- Justify your design decisions
- Produce manufacturing information, such as PCB artwork, CAD/CAM data, bill of materials (BOM), technical specification and simulation/analysis data

When the design has been agreed with your Tutor, you will need to construct the PCB safely, taking into account general Health and Safety requirements and local Risk Assessments. You will need to show evidence of:

- Manufacturing processes for the substrate;
- Visual pre-assembly quality control checks;
- Appropriate identification, handling and preparation of components;
- Component polarity and placement
- Hand soldering techniques
- Wire preparation e.g. stripping, tinning, trimming
- Connection of off-board components

You should then:

- Test the functionality of the circuit when your tutor agrees it is safe to do so. This should include post-assembly quality control checks.

Then, you will need to:

Collate all of your work from the designing, manufacturing and testing of the circuit into a single portfolio. You should then review and reflect on the activities that you have carried out, and make notes about what went well and what improvements could be made. You will also need to consider what would be done differently next time.

You will then:

Prepare a short 'lessons learnt' report that includes the lessons learnt from:

- Developing a printed circuit board
 - health and safety skills, including managing electrical hazards. You should consider electric shock and emergency actions, using appropriate personal protective equipment and keeping the work area clean and tidy
 - electronic circuit development skills, including component recognition, schematic capture, PCB design and construction methods
 - general engineering skills, such as interpreting drawings.
- your personal performance



	- time planning and management to complete all the different activities in an appropriate time and order - communication and literacy skills to follow and implement instructions appropriately, interpret documentation and communicate effectively with others in writing and orally - commercial and customer awareness to ensure the PCBs are fit for purpose and meet the brief.
Checklist of evidence required	A reflective developmental log detailing the design, manufacture and testing process undertaken. This should be accompanied by one or more observational witness statements, annotated photographs of the circuit being manufactured and tested, a formal assessment of the final circuit board and relevant behaviours applied. A 'lessons learnt' report of approximately 500-1000 words.
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
22/CD.D3	Refine, during the process, the development of a printed circuit board safely to improve its performance, whilst applying relevant behaviours and general engineering skills to a professional standard.
22/C.M3	Design and manufacture accurately and efficiently a printed circuit board that functions as intended, while documenting alternative solutions.
22/D.M4	Recommend improvements to the design and manufacture of the printed circuit board and to the relevant behaviours applied.
22/C.P5	Design a printed circuit board and generate documentation for manufacture.
22/C.P6	Manufacture safely a printed circuit board and identify any issues with the quality and functionality
22/D.P7	Explain how health and safety, design and manufacturing and general engineering skills were applied effectively during the manufacture of the printed circuit board.
22/D.P8	Explain how relevant behaviours were applied effectively during the design and manufacture of a printed circuit board.
Sources of information to support you with this Assignment	Books Reflective writing; Williams K, Wooliams M, Spiro J; Palgrave McMillan (2012); ISBN 978 0 230 37725 7 Report writing; Reid M; Palgrave McMillan (2012); ISBN 978 0 230 37655 7 Making printed circuit boards; Axelson J L; Tab Electronics (1993); ISBN-13: 978-0830639519 Websites http://www.wikihow.com/Write-Your-Own-Performance-Review Above are some examples of websites. Further useful resources may be found at



	http://qualifications.pearson.com/en/support/published-resources.html#step1
Other assessment materials attached to this Assignment Brief	Schematics for the circuit to be built using a single-sided through-hole board with 5 to 15 components.